

Appl. No. 10/657,096
Paper dated October 21, 2008
Reply to office action dated April 23, 2008

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior listings of claims in the application.

Listing Of Claims:

Claim 1 (previously amended): An integral, substantially air impermeable polymeric membrane for use in an electrochemical apparatus or process comprising:

a) a polymeric sheet comprising polymer and having a porous structure with a microstructure of fibrils,

b) the polymeric sheet having distributed in the polymer:

i) metal;

ii) an organic polymer; or

iii) a combination thereof, and

c) said porous structure being at least partially filled with an ion-exchange resin to provide ionic conductance for use in the electrochemical apparatus or process.

Claim 2 (cancelled).

Claim 3 (original): The membrane of claim 1 wherein the polymeric sheet has distributed therein a precious metal.

Claim 4 (cancelled).

Appl. No. 10/657,096
Paper dated October 21, 2008
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Claim 5 (previously amended): An integral, substantially air impermeable polymeric membrane for use in an electrochemical apparatus or process comprising:

- a) a polymeric sheet comprising polymer and having a porous structure with a microstructure of fibrils,
- b) the polymeric sheet having distributed in the polymer:
 - i) inorganic particulate;
 - ii) metal;
 - iii) an organic polymer; or
 - iv) a combination thereof, and
- c) said porous structure being at least partially filled with an ion-exchange resin to provide ionic conductance for use in the electrochemical apparatus or process, wherein the polymeric sheet has distributed therein fumed silica.

Claim 6 (original): The membrane of claim 1 wherein the polymeric sheet has distributed therein titania.

Claim 7 (cancelled).

Claim 8 (original): The membrane of claim 1 wherein the polymeric sheet has distributed therein platinum.

Claim 9 (original): The membrane of claim 1 wherein the polymeric sheet has distributed therein platinum supported on a substrate.

Claim 10 (previously amended): A polymeric membrane for use in an electrochemical apparatus or process comprising:

- a) a polymeric sheet comprising polymer and having a porous structure,
 - b) the polymeric sheet having distributed in the polymer:
 - i) metal;
 - ii) an organic polymer; or
 - iii) a combination thereof, and
 - c) said porous structure being at least partially filled with an ion-exchange resin to provide ionic conductance for use in the electrochemical apparatus or process,
- wherein the polymeric sheet is expanded porous PTFE, and said ion-exchange resin fills substantially all pores of the expanded porous PTFE.

Claim 11 (cancelled).

Claim 12 (original): The membrane of claim 1, wherein the polymeric sheet has metal distributed therein.

Claim 13 (original): The membrane of claim 1, wherein the polymeric sheet has an organic polymer distributed therein.

Appl. No. 10/657,096
Paper dated October 21, 2008
Reply to office action dated April 23, 2008

Claim 14 (original): The membrane of claim 1, wherein the polymeric sheet has a thickness of less than 50 microns.

Claim 15 (original): The membrane of claim 1, wherein the membrane is disposed between two fuel cell electrodes.

Claim 16 (canceled).

Claim 17 (previously presented): The membrane of claim 15, wherein the polymeric sheet has a thickness of less than 38 microns, and wherein the membrane that is disposed between said two electrodes of a fuel cell provides a steady state current of at least 1.78 amps/cm² at 0.5 volts, with no humidification of incoming fuel cell air and hydrogen reactants, with air and hydrogen feed both at 40 psig and 25°C, and the fuel cell temperature at 50°C.

Claims 18-23 (cancelled).

Claim 24 (previously presented): The membrane of claim 1, wherein said ion-exchange resin is fluorinated.

Claim 25 (previously presented): The membrane of claim 14, wherein the polymeric sheet has a thickness between 13 microns and 50 microns.

Appl. No. 10/657,096
Paper dated October 21, 2008
Reply to office action dated April 23, 2008

Claim 26 (cancelled).

Claim 27 (new): The polymeric membrane of claim 1 in which the polymeric sheet comprises a porous polymeric film; and the ion exchange resin is a polymer different from the polymeric film.

Claim 28 (new): The polymeric membrane of claim 1 in which the polymeric sheet has a porosity of 40% to 95%.

Claim 29 (new): The polymeric membrane of claim 1 in which the polymeric sheet has a porosity of 70% to 95%.

Claim 30 (new): The polymeric membrane of claim 1 in which the polymeric sheet comprises an expanded porous PTFE film having substantially fibrils with substantially no nodes present.

Claim 31 (new): The polymeric membrane of claim 1 in which an interior volume of the polymeric sheet is substantially occluded by the ion-exchange resin.